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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/360,292	07/22/1999	SUJIT SHARAN	M122-1106	3962

21567 7590 07/08/2002

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EXAMINER

AHMED, SHAMIM

ART UNIT PAPER NUMBER

1765

DATE MAILED: 07/08/2002

M

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/360,292

Applicant(s)

SHARAN ET AL.

Examin r

Shamim Ahmed

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-- The MAILING DATE of this communication appears on the cover sheet with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2002 .
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-24 and 35-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-24 and 35-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 July 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8 . 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 15-24,35-41 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 15,17-22,35-37 and 39-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharan et al (5,747,116) in view of Taguwa (6,020,254).

Sharan et al disclose a method of forming a contact to a silicon substrate, wherein a contact opening is formed over the silicon substrate and the opening is extending to expose outwardly a silicon containing material (col.3, lines 52-61 and figure 1). Sharan et al also disclose that during the above process before depositing any material over the substrate, plasma cleaning is performed to remove unwanted material using hydrogen-containing plasma (col.3, lines 62-67). Sharan et al do not explicitly teach that the contact opening is formed by applying a masking layer over the substrate. As to claims 21,36-37, Sharan et al remain silent about the processing temperature that can be maintained of at least 400 or at least 600 degree C. However, Taguwa teaches a plasma etching Process, wherein the substrate temperature is maintained at about 600

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degree C for etching residues from the openings or contact hole, which is formed by a conventional lithography and dry etching (col.5, lines 25-59). Therefore, it would have been obvious to one skill I the art at the time of claimed invention to combine Taguwa's teaching into Sharan et al's method for effective removal of the etching residues including damaged layer and a native oxide film from the surface of the contact region as taught by Tagawa. By doing so, one could have better control in the anisotropic etching of the oxide film as taught by Tagawa.

4. Claims 16, 23-24 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharan et al (5,747,116) in view of Taguwa (6,020,254) as applied to claims 15,17-22,35-37 and 39-41 above, and further in view of Stinnett (6,325,861). Modified Sharan et al discussed above in the paragraph 3 but fail to teach the introduction of at least two plasma etching using different gas chemistries. However, Stinnett discloses a method for etching and plasma cleaning of a substrate twice in order to remove unwanted remnant residue from the substrate (col.8, lines 31-40). As to claims 16 and 38, Stinnett teaches that the plasma gas comprises oxygen (col.7, lines 52-56). Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Stinnett's teaching into modified Sharan et al's method for efficiently removing the remnant resist material to expose the substrate surface as taught by Stinnett. By doing so, one could have a better process, wherein the etchant residue and the remnant resist is removed without using a wet cleaning process as taught by Stinnett (col.8, lines 46-49).

Response to Arguments

5. Applicant's arguments filed 4/16/02, regarding the Taguwa reference has been fully considered but they are not persuasive. Applicants argue that Taguwa does not teach a process, wherein an opening extending an opening to expose a silicon comprising layer at a base of the opening. This is not persuasive because Taguwa introduces a plasma etching using oxygen plasma after forming the opening or the contact hole and also after removing the masking layer (see figure 1C). Applicants also argue that the oxygen plasma forms an oxide film, after forming the contact hole. In response, Examiner point out that same effect will provide by the applicant's oxygen plasma as claimed in claim 16 because all the processing constituents are similar as claimed invention.

Remarks

6. It is noted that the abstract of the disclosure is 24 lines in two pages. Abstract should be maximum of 25 lines in a single page. Correction is required. See MPEP § 608.01(b).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-305-7718 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Shamim Ahmed
Examiner
Art Unit 1746

SA
June 29, 2002



RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700